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## **Applications of Monitoring for Producers**

Dr. Roy Roath

### Introduction

The context in which rangeland livestock enterprises operate is changing in the United States. Economic pressures, markets, agency policies, and greater environmental awareness are challenging range livestock operators to manage their operations more effectively and to respond to meet the challenges of the question "Are **you** a good steward of the land?" being posed by friend and foe, alike. This debate on land management practices is increasing. Much of this discussion is focusing on conflicts between the multiple uses of the resource. This affects the western livestock industry in a major way because **the industry will be judged on its best bad examples.**

By in large. I think that ranchers believe and understand that healthy, vigorous, productive rangelands are essential to their survival. Effective management of the forage resource base of your operation is about sustaining the very basis of production for your ranch. Recognizing the status of resources will reflect the effect of management actions and that managers should assess their practices for long-term sustainability is an important part of its program.

The western livestock industry sees the need for greater communication and understanding among all sectors involved in the care and use of public and private lands. This resource guide was developed with the objective of facilitating that need and providing decision-making and monitoring tools to assist in the management of sustainable ecosystems. Sustainable ecosystems will support financially sound range management enterprises capable of providing the economic return that sustains quality of life for the ranch family, the community, and the society.

Land managers need information on soil, water, and vegetative components of the resource base, as well as demands on that resource, to be able to develop sustainable management strategies. They also need to assess the impact of implemented strategies on the status of the resource. Monitoring is a process that provides baseline resource data and feedback information allowing managers to adjust their management strategies to meet their goals and objectives.

Monitoring is not a process that can be dealt with in isolation. Setting rangeland objectives and determining their feasibility is essential to monitoring. Managers need to know what and why they are monitoring. They cannot afford the time and the cost of collecting endless pieces of vegetation data without a clear understanding of how that data will be used. Monitoring, as presented here, is for use in the ranch management decision process. Information gathered but not used for decisions is wasted effort and resources.

### Goals, Visions, and Objectives

The next section will lean heavily on development of goals and objectives. While this probably sounds like organizational "gobbledy gook", the importance is in defining what you want

to happen and finding a way to get there. Every organization must have a purpose, a reason to be in business. This is called the organization's mission. When thinking about the future of your resource, you may be drawing a picture that does not exactly coincide with its present product, service, or position within the industry. That is your organization's vision - a statement of where you want to be in the future. The vital link between your mission and vision is the strategic plan.

The development of the mission statement takes place during a brainstorming session with all executives of an organization. In your case, it may be with family members, partners, landowners or board of directors. The group should draw a list of "purpose for existence" statements and use that list to outline the mission statement. Each person can draw one version of mission statement. Then, arrive at a final product through consensus. The mission statement must be brief, to the point, and easy to understand.

To develop the vision statement, concentrate on what the group wants the organization to become. The vision should include a quality statement, indicate where it will be in the future, and how you expect to provide a competitive advantage. It should be brief, inspiring, and provide a basis for decision-making. The vision is the road map that guides you to a new organizational framework.

If your operation includes the grazing of public lands, you should be aware of the values of the public who feels entitled to share the use of those public lands. Because your management actions will affect the sustainability of public lands and the biodiversity of the whole ecosystem, your vision statement should be developed based on your own values and those of the public.

The primary advantage of management by goals and objectives is the development of a systematic planning, monitoring, and improving approach. Managers who do not have a systematic plan can only react to change. They become "managed by", instead of managing the events impacting their organizations (Brocka and Brocka, 1992). The clearer the idea of what you want to accomplish, the greater the chances of accomplishing it. Real progress can only be measured in relation to what one is trying to achieve. Goals are non-quantitative statements of general intent. There may be many goals, but they must be concise. Examples of goals are: 1) To increase carrying capacity and profitability of the ranch; 2) To pass the ranching operation on to the children debt free; and 3) To maintain or improve the resource base creating a stable operation.

Objectives must flow from the goal statements. They are quantitative statements of future expectations. Gregg Simonds, manager of Deseret Land & Livestock stated "I have never achieved something I could not measure". Objectives guide the organization for 4 to 12 months and must be reviewed at least once a year.

The format of an objective should include the identification of a single-key result, a time frame, a calendar time, and the costs involved. Some examples of objectives are : 1) To reduce supplementation costs by \$\_\_./head by April 199\_\_ ; 2) Reduce debt this year by the amount of \$\_\_.; and 3) To have all pastures in "Improving" or "Near Desired" Range Resource Status in 10 years.

A strategy describes the procedure and method by which the targeted objective is to be accomplished. The actual number of strategies developed depend on the complexity of the objective. The first step is to list the strategies by which the objective can be met. Then, strategies should be ranked by order of choices. To obtain the ranking order of choices weight each strategy by its contribution, cost, and feasibility. In Robson's (1991) words, "identification of high leverage opportunities directs attention and resources to where improvement would provide the greatest benefit". Time and money are always limited, therefore, seek the greatest improvement, in the shortest time, with the least expenditure.

The development of objectives for the resource base, assessing the feasibility of those objectives based on the status of that resource base, and designing management strategies at the pasture level should be one of the high-priority enterprise management strategies. Checking for the feasibility of objectives at the resource level will in turn show the feasibility of the objectives at the enterprise level. If objectives will not be met at the resource level it is inevitable that they will not be met at the enterprise level either.

### Inventory

The assessment of the resource base should be one of the first management tasks to execute since it evaluates the relative capability of the rangeland to meet the overall enterprise goals and objectives. It implies obtaining and analyzing information about physical and biological components of the resource base. Available information is interpreted in terms of present status and capability of the resource. This step consist of: 1) obtaining baseline information; 2) conducting a pasture survey; 3) developing a landscape description and pastures objectives; 4) developing management strategies at the pasture level; and (5) monitoring the responses to management.

The pasture survey is implemented to characterize attributes of the management unit. The basic capacity of the range to produce vegetation and the various combinations of plant species possible on a given location are determined primarily by climate and soil properties. Soil properties determines the ability of the land to supply moisture and nutrients to plants.

### Present Plant Community

This step involves obtaining a survey of the species in the present plant community. In completing this step, consulting the Natural Resources Conservation Service (NRCS) Range Site Description may be helpful. Information should include: 1) Structure and appearance of the present plant community; 2) List of and percentage occurrence of the plant species present; and 3) Average length, beginning, and ending dates of growing season for present major natives species.

Frequency can be used to indicate relative change in a plant community but it cannot be used to indicate a specific amount of forage available. In spite of its limitation, frequency is the easiest, least costly, and mast reliable kind a quantitative data to detect changes in the role of a species in a entire plant community.

The best time of the year to collect frequency data depends on the growing season and the timing of use of the area. To reduce observer error in species identification, it is usually best to sample near the time of the peak of the growing season when most plants have seed heads and have been relatively unaffected by grazing and weathering. Collect frequency data at about the same growth stage, not necessarily the same calendar date. **A list of species in your area can be found by consulting the NRCS Range Site Descriptions.** The 100-point transect will be used. Identify the closest rooted plant to the point of your right shoe each time your right foot strikes the ground. Record the occurrence of species by tally. The percent frequency for each plant species is represented by the number of times that a plant species occurred in the 100-point transect divided by 100. Some concepts about the effect of grazing on grasses should be taken into account when considering management strategies at the pasture level. There are two distinct phases of grass growth: (1) a rapid growth period of vegetative material, and (2) a period of production of reproductive structures. The forage quality is much higher during the rapid spring growth of vegetative material. Therefore, it would be an advantage to grazing animals, to maintain plants in this period as long as possible. When grasses are in the vegetative growth period, there is rapid turnover and replacement of leaves.

Because sixty percent or more of the growth of each leaf is produced from the base of the plant, removal of some of the leaf material does not reduce the capability of that plant to produce new leaf material given two moderating factors: (1) the grazing animals consistently leave enough leaf material to provide for the photosynthetic needs of the plants and the production of new leaf material, and (2) the grazing animals utilize the leaf material only once or twice, giving that plant the chance to produce new leaf material without subsequent removal by grazing. Grazing during this period is not detrimental to the plant, provided the plant is allowed to produce new leaves while the conditions are right for regrowth.

When the grass plant enters into the reproductive period, the grazing process can, and in fact frequently does, have an adverse impact on the vigor of the plant. This happens for two reasons: (1) leaf growth ceases; and (2) as stems are extended, the growing points are available to grazing. The removal of these growing points causes a rather dramatic setback of the plant, both by removal of photosynthetic tissue, and by affecting the capability of that plant to grow without expending a great deal of additional energy to develop a new growing point from the crown. Therefore, excessive defoliation can be quite detrimental during this stage of growth. Management should allow the leaves to replenish the energy reserves that are stored in the crown of the plant for the use in the ensuing year. Management strategies should ideally use plants during only the green growth period and allow all grass plants under grazing to produce seed heads every year. However, in a rangeland environment, the livestock must be somewhere all the time. Therefore, some plants will be grazed during the time when they can be most affected.

A management strategy to minimize the leaf and stem removal during this period is important for maintaining the long-term productivity of the grasses in the stand. Additionally, designing a strategy whereby every plant can receive rest during its reproductive growth period every 3-4 grazing seasons is important.

In designing the management strategies, keep in mind the objectives for that pasture.

Appropriate grazing will incorporate some rest during the time when moisture and temperatures are proper to allow the plant time to regrow. Management of regrowth opportunity and leaf area remaining are the keys to designing grazing management strategies for long-term health and productivity of the grazing.

### Photo Points

Comparing photographs of the same area taken over a period of years furnishes visual evidence of vegetation and soil changes. Close-up photographs and/or general-view photographs are both useful in documenting changes through time. Close-up photographs show the type of plants present, the soil surface characteristics and the amount of covered by vegetation and litter. A designated plot facilitates returning to the same spot in subsequent years. To accomplish this, drive in stakes at two diagonal corners of a yard square frame to permanently mark a photo plot. Paint the stakes with bright colored permanent spray paint to aid in relocation. Place the photo identification label flat on the ground adjacent to the photo plot frame. Stand over the photo plot with toes touching the edge of the frame. A tripod will aid in consistent reproducible shots without blur.

General view photographs present a broad view of the site. These photographs are helpful in relocating the site. Place the photo identification label in an upright position so that it will appear in the foreground of the photographs. Include in the photograph the photo label, a general view of the site, and some skyline.

Follow the same process used in taking the initial photographs when taking repeat photographs. Take repeat photographs at approximately the same time of year as the original photographs. Include the same area and landmarks. Identify and file photographs in see-through plastic sheets in a binder for future reference.

### Vegetation Use

The Relative Degree of Use Rating shows the relative grass, forb, and browse use reflecting, to a point, the effect of management on the vegetation. It will be obtained by comparison between the vegetation in caged plots and the vegetation in uncaged plots. The difference between them is assumed to represent the amount of vegetation consumed by animals or otherwise lost during that period.

Locate caged plots within important areas on your ranch that are representative of the type of vegetation and locate area where the vegetation is critical to your operation. Mark the location of the plots so they can be relocated. Record the location in the pasture map.

Anchor a cage over one of the paired plots at each location. The base of a cage should be large enough to provide at least a 6-inch buffer zone between the edge of the plot and the side of the cage. Cover the lower portion of the cage (1-2 feet high) with wire netting small enough to exclude rabbits and rodents. The larger the mesh, the less influence the cage has in modifying the environment.

When locating a cage choose a least one other area where the vegetation is similar to that in the cage. If past experience shows that foraging is particularly uneven, choose two or more areas of similar vegetation for comparison to the caged area. Establish unprotected plots a minimum of 100 feet from protected plots. Unprotected plots should be inconspicuously marked to avoid attracting animals.

In the case where an evaluation of wildlife use, separated from livestock use is needed, a movable cage technique can be used. The cage is placed over a plot during the time when livestock are present. When livestock are removed, the area under the cage is marked and the cage moved to a new area which has been grazed by livestock but it is now protected from wildlife grazing.

### Degree of Use

The Relative Degree of Use Rating is obtained using a modified version of classification classes proposed by the BLM (1992). In this case the classification is based on the use of desirable and less desirable species instead of "value of species for forage" as in the BLM classification. Group the "highly" and "moderately" desirable grasses and forbs species listed in just "desirable" species. Compare them against the "less desirable" species.

1. Herbage Use Classes: Three use classes are used to show the relative degree of use of desirable herbaceous species (grasses and forbs). **Use classes are described as follows:**  
(a) Light. The rangeland may be topped, skimmed, or grazed in patches. The less desirable herbaceous plants are ungrazed and 60 to 80 percent of the number of current seed stalks of desirable herbaceous plants remain intact; (b) Moderate. The rangeland appears entirely covered as uniformly as natural features and facilities will allow. Fifteen to 25 percent of the number of current seed stalks of desirable herbaceous species remain intact. No more than 10 percent of the less desirable herbaceous plants are utilized; and (c) Heavy. The rangeland has the appearance of complete search. Desirable herbaceous species have less than 10 percent of the current seed stalks remaining. Shoots of rhizomatous grasses are missing. More than 10 percent of the number of less desirable herbaceous plants have been utilized. The rangeland has a mown appearance and there are indications of repeated coverage. There is no evidence of current seed stalks of desirable herbaceous species. Desirable herbaceous species are completely utilized. The remaining stubble of preferred grasses is grazed to the soil surface.

### Use Map

The use map is the opportunity for the cowboy to record where the cows go and what the distribution of use is when they are there. This is a record that documents the pattern of use across a pasture. The record is kept as described in the use above as areas with light, moderate or heavy use. These areas depict where use is too heavy and management should be modified to reduce that use, where the use is moderate and acceptable and where the use is light where more use might be an unrecognized opportunity. The challenge is to solve the heavy use problems and take advantage of the opportunities presented in areas of little use.

## Grazing Response Index

The grazing response index is comprised of three qualitative ratings that are tied to key concepts relating plant health, including frequency, intensity and opportunity of the plants to grow or to regrow. **Frequency** refers to the number of times a plant is grazed in a grazing period. The higher the frequency of use in a grazing period, the greater the impact of grazing is on plant vigor, and the lesser the chances of regrowth in the next grazing season. Frequency is regulated by the duration of the grazing period. It is independent of animal density but is dependent on the grazing duration or length of time that the animals are in the pasture. Animal density is the number of animals per unit area.

If plants in a pasture has been grazed no more than once in a growing season a positive ranking (+1) is given. If plants in a pasture have been grazed twice in a growing season a ranking of neutral (0) is given. If plants in a pasture have been grazed three or more times in a grazing season a negative ranking (-1) is given. Record this rating in Worksheet 1. Generally, when an area is available to be grazed for more than 15 days, the probability of being grazed more than once increases.

**Intensity** of use is the amount of plant material removed by grazing in a given event and is regulated by stocking rate. To maintain the health and vigor of a plant, adequate amount of leaf surface area (amount of leaf present) must remain at a time when the plant can grow. The less intense the grazing, the greater the opportunity for the plant to maintain its photosynthetic area and produce new growth.

If less than fifty percent of the leaf area of plants in a pasture on average is removed, then a positive ranking (+1) is assigned. If about fifty percent of the leaf area of the plants in a pasture is removed a neutral ranking (-0) is assigned. If more than fifty percent of the leaf area of the plants in a pasture is removed a negative rating (-1) is assigned.

**Opportunity** of the plant to grow-regrow is the one factor most highly related to long-term health and vigor of the vegetation. It depends an the temperature, availability of water, and leaf area. Opportunity to regrow depends on the capability of the habitat that is being grazed. In areas that are arid and receive small amounts and/or unpredictable precipitation, the opportunity to regrow must be quite carefully considered.

Conversely, areas with deep soil and good moisture will regrow more dynamically than lower potential areas. Estimates on the opportunity to regrow will be made for the plants in a pasture based on minimum opportunity to regrow (-2), moderate opportunity to regrow (0), and maximum opportunity to regrow (+2).

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